

addresses, as well as numerous reviews and articles, all written in a characteristic style; apart from the two editions of his well known "Atlas," and the revised and extended editions of Huxley and Martin's "Elementary Biology" (in collaboration with Prof. D. H. Scott). He also edited the translation by Bernard of Wiedersheim's "Bau des Menschen," and had undertaken to prepare a new edition of Huxley's "Anatomy of Vertebrated Animals," which he had mapped out in his mind, but never actually began. His original work deals mainly with vertebrate comparative anatomy, and all shows the same thoroughness and accurate knowledge.

Considerable and important as his direct contributions to science have been, they only represent a part of his life's work in this direction, for he considered it his duty to devote much time to the business of scientific societies and in helping any serious workers who applied to him; he spared no trouble in assisting others.

Never a robust man, Howes's power of work was extraordinary. He never seemed to be in a hurry, and did not give one the impression that he spent an excessive amount of time in reading the current literature of his subject, although his knowledge and memory in this direction were quite unique. His mind was of a remarkable type, and was, one may say, almost overburdened with details, though he never lost sight of the main issue, and was always clear and stimulating. He absorbed everything which had the remotest bearing on his science, and would talk by the hour on almost every branch of zoology; one had only to ask him some question and he would either have the point at issue at his finger-ends, or would at once give references to the most recent papers on the subject. When giving a lecture or an address, he would put so much into an hour's discourse as to make his hearers marvel at his memory and grasp of the subject. His presidential address to the zoological section of the British Association in 1902 contains no less than 186 references to original authorities, and its preparation must have cost him an enormous amount of labour at a time when he was already over-fatigued.

Howes was a man of high moral standard and ingenuous nature, generous and unselfish in all he did, and his death is mourned by a wide circle of scientific friends, who will long cherish the memory of his friendship and hospitality. He carried out his own belief that "higher ambition than that of adding to the sum of knowledge no man can have; wealth, influence, position, all fade before it; but we must die for it if our work is to live after us."

W. N. P.

#### NOTES.

THE following fifteen candidates have been selected by the council of the Royal Society to be recommended for election into the society:—Mr. J. G. Adami, Mr. W. A. Bone, Mr. J. E. Campbell, Mr. W. H. Dines, Capt. A. Mostyn Field, R.N., Mr. M. O. Forster, Mr. E. S. Goodrich, Mr. F. G. Hopkins, Mr. G. W. Lamplugh, Mr. E. W. MacBride, Prof. F. W. Oliver, Lieut.-Col. D. Prain, I.M.S., Mr. G. F. C. Searle, Hon. R. J. Strutt, and Mr. E. T. Whittaker.

THE piercing of the Simplon Tunnel was completed at 7.20 a.m. on February 24. At the time of piercing, the north gallery was inaccessible on account of the accumulation of water. The south gallery is on a lower level than the north, and the final connection was made by the explosion of charges placed in holes driven into the roof of the south gallery, which left a large hole on a level with the floor of

the north gallery. No sooner was the piercing effected than the accumulated water flowed rapidly away down the southern side, and was discharged into Italy without doing damage. It is unnecessary again to direct attention to the particulars of this triumph of engineering skill, for a detailed account of the difficulties with which the engineers have had to contend, and the expedients utilised to surmount these obstacles, will be found in an article by Mr. Francis Fox in NATURE for October 27, 1904 (p. 628, vol. lxx.). The work that now remains to be done is to put in place the masonry arching, to cover over the water channel beneath the floor of the tunnel, and to lay the permanent way. It is expected that within three months trains will be running, and the railway will prove a vital link in the line of communication between the Italian cities and mid-Europe.

ON Friday, March 17, Senor Manuel Garcia, the inventor of the laryngoscope, will complete his hundredth year, and the anniversary will be celebrated by a meeting of laryngologists at the rooms of the Royal Medico-Chirurgical Society, Hanover Square. We learn from the *British Medical Journal* that the Spanish Ambassador will attend to congratulate the illustrious centenarian in the name of the Government of his native country, and among the addresses will be one from the Royal Society, before which Senor Garcia read his paper entitled "Physiological Observations on the Human Voice" just fifty years ago. The Berlin, Vienna, French, Dutch, Belgian, and South and West German Laryngological Societies will send special deputations. Most of the addresses will be taken as read, and the proceedings will conclude with the presentation of a portrait of Senor Garcia, painted by Mr. John Sargent, R.A., together with an album containing the names of all the subscribers. In the evening a banquet will take place at the Hotel Cecil, at which it is hoped that Senor Garcia himself will be present.

THE death is announced, on February 6, of Father Timoteo Bertelli. Father Bertelli was born in Bologna in 1826, and was the son of the professor of astronomy at the University of Bologna. At eighteen he joined the Order of the Barnabites, and taught physics in various colleges of the Order. In 1871 he joined the Collège de la Querce in Florence, with which institution he appears to have been associated continuously until the time of his death, except for the three years 1895-7, when he was called to Rome by Leo XIII. to succeed Father Denza at the Vatican Observatory. But his state of health did not permit him permanently to accept this position, and in 1897 he returned to Florence. Father Bertelli first devoted himself to meteorology, and later was attracted by the study of seismic phenomena, inventing the tromometer to assist in his observations. He gave much attention to researches into the history of the sciences and especially to that of the mariner's compass. The results of his life's work are contained in some sixty memoirs, the first of which is dated 1859.

DR. A. S. PACKARD, professor of zoology and geology at Brown University, died on February 14, at the age of sixty-six years. The death occurred, on February 22, of Dr. Ernst F. Dürre, formerly professor of metallurgy at Aix-la-Chapelle, and author of several important treatises on the metallurgy of iron and steel. Dr. Guido Hauck, professor of mathematics at the Berlin Technical College, died on January 14. The deaths are also announced of J. C. V. Hoffmann, founder and editor of the *Zeitschrift für mathematischen und naturwissenschaftlichen Unterricht*, Dr. T. H. Behrens, professor of microchemistry at Delft, Prof. Ludwig von Tetmeyer, principal of the Vienna Technical College, and Prof. Ditscheiner, of Vienna.

WE learn from the *Times* that Prof. Adolf Bastian, director of the Berlin Ethnographical Museum, has died at Port of Spain, Trinidad, in his seventy-ninth year, while on a scientific expedition. Prof. Bastian, who was a distinguished traveller for many years, enjoyed a wide reputation as the author of numerous ethnological and anthropological works, of which the best known is "The Peoples of Eastern Asia."

THE council of the University of Birmingham recently assigned a plot of land on the new university site at Bournbrook in order to enable Mr. Walter E. Collinge, the lecturer in zoology, to continue his experiments and observations upon the life-histories of the black-currant gall-mite and the plum aphid, with the view of obtaining remedies for exterminating or holding in check these pests to fruit-growers.

THE annual dinner of the Institution of Civil Engineers will be held on Wednesday, March 22, at Merchant Taylors' Hall, Threadneedle-street, E.C. Sir Guilford Molesworth, president of the institution, will occupy the chair.

AN interesting excursion has been arranged by the American Institute of Mining Engineers. In the first week in July a meeting will be held at Victoria, British Columbia, and this will be followed by a three weeks' trip to the mining districts of Alaska.

A VALUABLE contribution to economic geology is afforded by an article on the Hauraki goldfields of New Zealand published by Mr. W. Lindgren in the *Engineering and Mining Journal* of New York. The occurrence of gold is very similar to that in Transylvania. The gold is met with in quartz veins traversing andesite altered into propylite. The minerals accompanying the gold are dolomite, pyrites, blende, galena, and ruby silver ore. Near the surface the sulphide ores are oxidised; and the greatest yield of gold has been obtained at points where the veins cross.

In the *Transactions* of the Faculty of Actuaries, No. 18 (1905), Dr. James Buchanan discusses the use of various modifications of Simpson's rule in the performance of the integrations involved in the calculation of survivorship benefits.

In the *Physikalische Zeitschrift* for February 1, Profs. Elster and Geitel discuss the radio-activity of certain sediments from the German mineral springs, and Messrs. A. Herrmann and F. Pesendorfer describe experiments indicating traces of radio-activity in the gases from the Sprudel spring at Carlsbad.

AN interesting feature of the Johns Hopkins University *Circular* is the series of "Notes in Mathematics," edited by Prof. Frank Morley, appearing in the January number. These notes deal with "A system of parastroids" and "A curve of the fifth class" (Mr. R. P. Stephens), "Applications of quaternions to four dimensions" and "Some invariant relations of linear correspondences" (Mr. H. B. Phillips), "A closed system of conics" (Mr. Charles C. Grove), and "The normal form of a collimation and the reduction of two conics to normal form" (Mr. A. B. Coble).

PROF. HANS LANDOLT, of Berlin, has received the Prussian Imperial Gold Medal for Science.

THE city of Lincoln is now suffering from a serious outbreak of typhoid fever. The epidemic started at the beginning of January, and up to date nearly 800 cases have been notified. The epidemic is plainly a water-borne one, milk

and other articles of diet being excluded as channels of diffusion by the extent of the outbreak and its regular distribution over the whole area. The water supply of Lincoln is derived from the River Witham, the water being passed through sand filters before distribution. Attention has been directed from time to time to the unsatisfactory quality of the water, and in 1901 the boring of a deep well into the sandstone was commenced, but after the bore had reached a depth of 880 feet in 1903 the boring tool was lost, and has not been recovered, thus entailing serious delay. The epidemic, it is surmised, has been caused by pollution of the Witham or its tributaries above the intake. It is unfortunate that works were in progress in the autumn to improve the filter beds by deepening the layer of fine sand, but were put a stop to by the early frost, and the same event caused many of the consumers to leave their taps running, and thus to necessitate an increase in the rate of filtration to meet the increased demand.

THE Fishmongers' Company has published a preliminary report by Dr. Klein, F.R.S., on experiments undertaken for the company to ascertain the duration of vitality of the typhoid bacillus when introduced into shell-fish. The main conclusions arrived at are:—(1) Oysters readily take up into their interior the *Bacillus typhosus* which has been introduced into their shell or into the surrounding sea-water. (2) Oysters, clean at starting, rapidly clear themselves of the ingested typhoid bacilli if they are kept in clean water which is frequently changed. (3) Oysters, clean at starting, clear themselves of the ingested bacilli to a less extent and slower if they are kept in a "dry" state—i.e. out of the sea-water. (4) Oysters, from a polluted locality, clear themselves of the ingested bacilli to a less extent, and at a slower rate, even if kept in clean sea-water, than oysters clean at starting. (5) Oysters from a polluted locality, containing a large number of the *Bacillus coli*, very rapidly clear themselves of this microbe, whether kept in or out of the water. This shows that *Bacillus coli* is foreign to the oyster and is rapidly destroyed by it. When, therefore, it is present in the oyster, it must have been derived from the surroundings. (6) However largely infected with typhoid bacilli, the oysters at no time present to the eye any sign of such infection; they remain in all parts of normal aspect. (7) Cockles and muscles similarly take up the typhoid bacillus, but clear themselves much more slowly, particularly in the case of cockles, than do oysters.

THE geographical results of the National Antarctic Expedition, in so far as they relate to the distribution of land, water, and ice within the area allotted to the expedition for exploration, were described by Captain R.F. Scott before the Royal Geographical Society on Monday. He remarked that the main geographical interest of the expedition was the practical observation of a coast-line from Mount Melbourne, in lat.  $74\frac{1}{2}^{\circ}$ , to Mount Longstaff, in lat.  $83^{\circ}$ , and of the conditions which lie to the east and west of this line. The coastal mountains are comparatively low between Mount Melbourne and the Ferrar glacier, and it was the tabular structure of these that first indicated the horizontal stratification of the mainland. But low as the mountains are, in one place only does the internal ice-sheet seem to pour any volume of ice into the sea. It is certain that the ice-cap is of very great extent, and there is evidence that it maintains a great and approximately uniform level over the whole continent. The greater portion of this great ice-sheet is believed to be afloat. The soundings made by the expedition show that some hundreds of fathoms of water still intervene between the bottom of the ice at the barrier edge and the floor of the sea; but the barrier edge sixty

years ago was in advance of its present position, in places as much as 20 or 30 miles, and therefore the soundings lie directly beneath Sir James Ross's barrier, and a considerable distance from its edge. The ice-sheet, and the curious and often vast ice-formations met with in the Ross sea, are therefore regarded, not as the result of present-day conditions, but the rapidly wasting remnants of a former age.

SENOR A. ARCIMIS informs us that Mr. Valderrama, director of the Municipal Meteorological Observatory at Santa Cruz (Canaries), observed a fall of dust on January 29 and January 30. During all the former day a very fine dust fell continuously, but not in great amount. On January 30 a rain of a yellow and very fine dust began at 15h. The wind-vane pointed to the S.S.W., and the atmosphere was charged with the very fine dust, the horizon being invisible through a kind of dry fog that introduced itself into the mouth and throat, producing the same effect as when marching on a dusty highway in a hot summer day. All the instruments exposed freely out of doors were covered with the nearly impalpable dust.

At the recent annual meeting of the Glastonbury Antiquarian Society, Prebendary Grant gave an account of the exploration at the ancient British Lake Village at Glastonbury during the summer of 1904. Three new mounds were examined, and the exploration of four others was completed. The "finds" included amber and glass beads, spiral finger-rings of bronze wire, a massive bronze buckle (taken to have been connected with horse-harness), a bronze object which is supposed to have been some part of horse-trapping, a variety of bone objects, wool combs, hammers, portion of horses' bits, and a roedeer antler, pointed and used as a modelling tool for decorating pottery. Several pieces of pottery were dug up. Flint flakes and knives were found, proving that flint implements were made at the village. With respect to wooden articles, two wheel-spokes, finely turned and finished, were found, and a fragment of an axle-box belonging to the same wheel. Iron bars were found also at the Lake Village, and after minute investigation the conclusion has been arrived at that these bars are iron currency bars used by the ancient Britons at the time of Cæsar's invasion.

A LARGE number of new types of Japanese land-shells of the *Clausilia* group are described by Mr. Pilsbry in the December issue of the *Proceedings* of the Philadelphia Academy.

THE shore fishes of the Galapagos and other Pacific islands are described by Messrs. Snodgrass and Heller in part xvii. of the publications of the Hopkins-Stanford Expedition (*Proc. Ac. Washington*, vi., pp. 333-427). Two species are described as new.

THE *Emu* for January contains Captain Hutton's presidential address to the Australasian Ornithologists' Union, which deals with the geographical origin and subsequent development of the land birds of New Zealand. An interesting feature of the issue is the reproduction of a photograph of a red gum-tree containing the nests of seven species of birds.

*Nature* for January and February contains two illustrated articles on whales and whaling. In the former issue Prof. G. Guldberg describes the method of hunting the Greenland right whale, illustrating his article with reproductions from two old prints. In the February number Mr. E. Koefoed records the capture of a Biscay right whale, or "nordkaper," at Mjofjord, on the west coast of Iceland, and also of a cachalot in northern waters. Two photographs of the former cetacean are reproduced.

STEPNEY has published a handbook to the vivaria and aquaria in the Borough Museum, the text of which is reproduced, with certain alterations and additions, from the handbook to the Horniman Museum. It is to be hoped that the descriptive portion, when read in the museum, may aid visitors to a right appreciation of the exhibits, but as it stands the guide is admirably calculated to puzzle beginners in systematic zoology. For instance, from the headings on pp. 24 and 25, the reader would be led to infer that while *Argyroneta* is the scientific designation of the water-spider, and *Podura aquatica* that of the water-springtails, *Blattidae* is the name for the cockroach, and from p. 50 that *Lacertilia* is the generic title for the typical lizards. Again, from p. 17 he would be led to suppose that *Gastropoda* is the generic term for snails, and that these rank in classificatory value with the viviparous pond-snail (*Paludina vivipara*). Careful study of the text may in some cases put matters right, but the muddle is as bad as bad can be for beginners.

THE address on morphology generally, its modern tendencies and progress, and its relation to other sciences, delivered by Prof. A. Giard before the Congress of Sciences and Art at the St. Louis Exhibition in September last, is published in the *Revue Scientifique* of February 4 and 11. After referring to the revolution in biology effected, first by Lamarck and subsequently by Darwin, the author proceeds to sketch the gradual evolution of modern biological conceptions and theories, dwelling especially on Wolff's hypothesis of epigenesis. Reference is then made to the importance of the study of variation, both among living and extinct types, after which the author passes on to review the influence that palæontology has exerted on biology and the doctrine of evolution. Abiogenesis next claims attention, while the author concludes his discourse by reference to some of the evils attendant on the extreme specialisation of scientific work at the present day. It is time, he urges, that a general organisation to direct scientific work should replace the present state of anarchy, whereby much energy that is now practically wasted would be diverted towards the attainment of a common end and object.

THE fifth part of Mr. J. H. Maiden's "Critical Review of the Genus *Eucalyptus*" includes three species. *Eucalyptus stellulata* receives its name from the disposition of the buds, and is known as black Sally, or muzzelwood; the leaves show longitudinal lateral veins similar to those of the next species, *Eucalyptus coriacea*, which is distinguished by its clean white stem. The third species, *Eucalyptus coccifera*, confined to Tasmania, is sufficiently hardy to have been planted in parts of the United Kingdom.

THE alien problem is not unknown to botanists, and the genus *Sisymbrium* has added two foreign species to the flora of Lancashire. *Sisymbrium pannonicum* is definitely naturalised along the coast from St. Anne's to Crosby, and according to a recent account by Mr. C. Bailey in vol. xlix. part i. of the *Memoirs and Proceedings* of the Manchester Literary and Philosophical Society, *Sisymbrium strictissimum*, a native of continental Europe, has obtained a foothold near Heaton Mersey, where it has been observed for fifteen years.

In a paper only recently published in vol. ii., No. 3, of the *Contributions* from the botanical laboratory of the University of Pennsylvania, but which represents work done two years earlier, Dr. O. P. Phillips maintains that the central body in the cells of the Cyanophyceæ represents a true nucleus, but he failed to obtain complete stages in its



mitotic division. Dr. Phillips is of opinion that the movement of the filaments of *Oscillaria* and *Cylindrospermum* is due to protoplasmic processes or cilia which, he says, are to be observed around all the cells. The chromatophore, containing cyanophycin granules, was identified as a peripheral zone.

AN interesting address on the present problems of meteorology was given by Mr. A. I. Rotch to the section of cosmical physics of the International Congress of Arts and Sciences at St. Louis, and was printed in *Science* on December 23 last. The author pointed out that although it is nearly fifty years since the first commencement of weather telegraphy, and much has been done to complete and extend the area under observation, the methods employed in the preparation of weather forecasts are still essentially empirical, and practically little or no progress has been made. This is mostly due to the fact that until recently observations have been carried on solely at the bottom of the atmosphere. Even the observations made at mountain stations still pertain to the earth and do not represent the conditions prevailing in free air. The still more recent use of unmanned balloons and kites has led to the acquirement of a knowledge of the vertical gradients of meteorological elements which contradicts previous conceptions, e.g. that the temperature diminished with increasing altitude more and more slowly, whereas the results show that it decreases more and more quickly with increasing altitude. The international cloud observations at various altitudes discussed by Dr. Hildebrandsson also show that theories held heretofore are untenable, and that there is no exchange of air between poles and equator. With regard to cosmical relations to meteorology, the author points out that neither the effects of the periods of solar or lunar rotation upon the earth's meteorology can be claimed to have been proved. But coincidences—if nothing more—have been shown by Sir Norman and Dr. Lockyer to exist between sun-spot frequency and atmospheric changes, especially as manifested by barometric pressure, rainfall, and temperature. It does not seem impossible, therefore, that the discussion of meteorological observations from the point of view of their relation to solar phenomena may eventually lead to seasonal predictions of weather possessing at least the success of those now made daily.

THE Survey Department of the Egyptian Public Works Ministry has sent us the meteorological report for the year 1902. This volume indicates that the Director-General of the Survey Department, Captain H. G. Lyons, is making rapid strides, not only in increasing the number of stations which send in records, but in publishing a considerable amount of valuable information which should prove of great value. We are told that arrangements are in progress for commencing a systematic measurement of rainfall in the Delta and western part of the Mediterranean coast; that a monthly *résumé* of the weather has been started; and that forecasts during the early and late months of the year have been issued. All these show the activity that is being displayed in the collection and dissemination of meteorological data. The present report includes magnetic as well as meteorological observations, and also Nile gauge readings. At the end are given numerous curves representing the variations of the meteorological elements as registered at the Abbassia Observatory.

THE *Journal* of the Röntgen Society (vol. i., No. 2) contains a note by Mr. J. H. Gardiner on the new ultra-violet glass manufactured by Messrs. Schott and Genossen, of Jena; it is illustrated by photographs of spectra showing the transparency of the glass in the ultra-violet region.

FLUORESCENT substances are usually regarded as exceptions to Kirchhoff's law of absorption on account of their being able to emit light which in ordinary circumstances they do not absorb, but hitherto no investigation has been made of the absorptive power of such substances during active fluorescence. In the *Physical Review* for December, 1904, Messrs. E. L. Nichols and Ernest Merritt show that substances such as fluorescein, when caused to fluoresce strongly in solution, produce a decidedly different absorption from that of the feebly illuminated material, and that the absorption curve obtained in this way is intimately connected with the curve of fluorescence. In the case of five different substances, moreover, there is conclusive evidence of a slight increase in electrical conductivity accompanying the phenomenon, and on this account a dissociation hypothesis is brought forward to explain the nature of fluorescence.

AN address delivered by Prof. Edward B. Rosa at the opening of the John Bell Scott Memorial Laboratory of Physical Science at Wesleyan University, Connecticut, is printed in *Science* for February 3. It deals with the National Bureau of Standards, which commenced work in the United States in 1901, and defines its functions and ideals. It is to be noted that research plays a prominent part in the programme of the bureau. We have already had occasion to refer to Dr. Guthe's critical investigation of the various forms of silver voltameter (*NATURE*, vol. lxx., p. 583), and to the determinations by Drs. Waidner and Burgess of the temperature of the electric arc (*NATURE*, vol. lxxi., p. 132). Both these researches were carried out under the auspices of the bureau, and in addition to these, the *Physical Review* for December, 1904, contains a valuable communication by Drs. Waidner and Burgess on "Radiation Pyrometry," in which the degree of accuracy of several radiation pyrometers is discussed. The bureau does not confine itself entirely to physical and mechanical measurements, but contains a department devoted to chemistry, one of the purposes of which is to attempt to secure uniformity in technical analyses. A characteristic of the bureau which deserves particular notice is its aim not only to conduct investigations through its own staff, but also to afford facilities for research to others who may come to work for a limited period as scientific guests. In this way it is hoped that "the output of original research in America will be materially increased."

THE remarkable catalytic power of reduced nickel, discovered some years ago by MM. Paul Sabatier and J. B. Senderens, has been applied by them in many directions, and has been especially fruitful in the addition of hydrogen to cyclic compounds. Applying this reaction in another direction, the authors in the current number (February 20) of the *Comptes rendus* describe the reduction of nitriles to amines. The nitrile, with an excess of hydrogen, is passed over reduced nickel at temperatures between 250° and 300° C. Hydrocyanic acid might be expected to yield methylamine, but, as a matter of fact, the nickel was found to exert a further action, both dimethylamine and trimethylamine being produced, together with ammonia and the primary amine. With acetonitrile all three amines are likewise produced, the diethylamine, which forms about three-fifths of the mixture, predominating. Dipropylamine was similarly the chief product of the reaction with propionitrile; with capronitrile, derived from ordinary amyl alcohol, besides the three amines, two of which were new, an appreciable proportion of the hydrocarbon  $\alpha$ -methyl-pentane was obtained. The yields were in all cases good with fatty compounds, but the reaction was less satisfactory when applied to the aromatic series, there

being a tendency for the hydrocarbon and ammonia to be the chief products.

*Globus* for February 23 is a special number containing contributions by friends and admirers of Prof. R. Andree, who reached his seventieth birthday on February 26.

THE third part of the *British Journal of Psychology*, published by the Cambridge University Press, has been received. The number contains five papers in addition to a report of the proceedings of the Psychological Society. Mr. Norman Smith discusses Malebranche's theory of the perception of distance and magnitude; Mr. F. N. Hales considers the materials for the psychogenetic theory of comparison; Mr. W. G. Smith makes a comparison of some mental and physical tests in their application to epileptic and to normal subjects; Prof. Mary W. Calkins defines the limits of genetic and of comparative psychology, and Mr. C. Spearman makes an analysis of "localisation," illustrated by a Brown-Séquard case.

### OUR ASTRONOMICAL COLUMN.

#### ASTRONOMICAL OCCURRENCES IN MARCH:—

- March 5. 17h. Sun eclipsed; invisible at Greenwich.  
 7. 13h. Juno in conjunction with Moon. Juno  $1^{\circ} 27' S.$   
 9. Jupiter in conjunction with Venus. Venus  $5^{\circ} 30' S.$   
 11. Jupiter in conjunction with Moon. Jupiter  $3^{\circ} 15' N.$   
 12. 10h. 11m. to 11h. 6m. Moon occults  $\gamma$  Tauri (mag. 3.9).  
 17. 12h. 34m. Minimum of Algol ( $\beta$  Persei).  
 20. 9h. 2m. to 9h. 49m. Moon occults  $\beta$  Virginis (mag. 3.8).  
 „ 9h. 23m. Minimum of Algol ( $\beta$  Persei).  
 21. 12h. Venus at maximum brilliancy.  
 24. 7h. Mars in conjunction with Moon. Mars  $3^{\circ} 40' S.$   
 „ Vesta in opposition to Sun.

#### REPORTED DISCOVERY OF A SEVENTH SATELLITE TO JUPITER.

—A telegram received from the Kiel Centralstelle announces the discovery of a seventh satellite in the Jovian system. The description reads:—16 magnitude, position on February 25 62 degrees, distance 21 minutes, daily motion 60 seconds south-easterly.

PLANETARY TIDES IN THE SOLAR ATMOSPHERE.—In a communication published in the *Bulletin de la Société astronomique de France* (February, 1905), M. Émile Anceaux discusses the question as to whether the undecennial periodicity of sun-spots may not result from the fluctuations of tides set up in the solar atmosphere by the concerted action of Jupiter, the earth, Venus, and Mercury. He classifies the tides as binary, ternary, and quaternary, according to the number of planets acting in their production by being in, or near, opposition or conjunction. The ternary tide due to the combined action of Jupiter, Venus, and the earth is supposed to be the most important factor in regulating the appearance of spots, and a curve showing the fluctuations in the strength of this tide, as calculated from the knowledge of the planetary positions, agrees fairly well with the sun-spot curve for the years 1891 to 1905.

Finally, the author arrives at a number of conclusions of which the more important are:—(a) That sun-spots are the indirect consequences of such tides; (b) that the combined action of the three planets especially mentioned governs the fluctuations of the spot period; (c) that this ternary tide obeys an eleven-year period; (d) that the variation of the sun-spot period is due to the eccentricities of the planets, chiefly Jupiter.

THE BRUCE PHOTOGRAPHIC TELESCOPE.—The Bruce photographic telescope, with which a number of beautiful photographs of nebulae, Milky Way regions, &c., have already been obtained at the Yerkes Observatory, is described in

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detail in an illustrated article by Prof. Barnard published in No. 1., vol. xxi., of the *Astrophysical Journal*.

The telescope was erected, at the cost of Miss Catharine Bruce, at Yerkes in April, 1904, but has now been dismounted and shipped to Mount Wilson, Pasadena, where it is to be used for photographing those regions of the Milky Way not attainable at the former observatory.

It consists of a 5-inch guiding telescope firmly bolted to two other tubes, which carry photographic doublets of 10-inches and  $6\frac{1}{4}$ -inches aperture respectively. The focal length of the 10-inch is only 50 inches, and the polar axis of the instrument has been formed by bending the upper part of the iron pier to the required inclination so that the camera may make a complete revolution about the axis without having to be "reversed." For use in different latitudes an iron wedge-shaped section may be introduced between the upper and lower parts of the pier in order to produce the required change of inclination, whilst a special arrangement, whereby the clock motion may be reversed in two minutes, has been introduced into the driving gear so that the same mounting may be used in the southern hemisphere.

The 10-inch doublet, by Brashear, gives excellent definition over a field  $7^{\circ}$  wide, and the scale is such that 1 inch =  $1^{\circ}.14$ , or  $1'' = 0.88$  inch. The ratio aperture/focal length =  $1/5.03$  is that which Prof. Barnard believes to be the best for the purpose for which this instrument was designed. The  $6\frac{1}{4}$ -inch Voigtlander doublet has a focal length of 31 inches, and is used in conjunction with the 10-inch for the purpose of verification. Specimen photographs accompany the description, and these testify eloquently to the satisfactory performance of each of the doublets.

PHYSICAL CONDITIONS OF THE PLANETS.—In a communication to No. 3992 of the *Astronomische Nachrichten* Prof. T. J. J. See deals exhaustively with the methods that he has employed and the results he has obtained in a research on the internal densities, pressures and moments of inertia of the principal bodies in the planetary system. Some of the results obtained in the preliminary discussion of the available fundamental data are of great interest. For example, he arrives at the conclusion that the most probable values for the rotation period and for the oblateness of Uranus are 10h. 6m. 40.32s. and 1:25 respectively, whilst for Neptune the similar values are probably 12h. 50m. 53s. and 1:45.

In the case of the earth, Laplace's law of densities appears to be a natural law, for the value obtained for the oblateness of the outer stratum, or surface, of the globe agrees very well with that obtained as a mean of the most trustworthy of the determinations by more direct methods. The probable value obtained for the pressure acting at the earth's centre is 2383.152km. of mercury, a quantity so enormous that Prof. See attempts to render it more comprehensible by suggesting that it is 7838 times as great as a column of mercury equal in height to the Eiffel Tower.

The probable pressure at the sun's centre is nearly 212 billion atmospheres. A column of mercury acting solely under terrestrial gravitational acceleration would have to be high enough to extend beyond the sun in order that it might exert such a pressure.

Similar results for the density and pressure at different levels in the planets and satellites are given in two of the tables accompanying Prof. See's paper, and are also shown diagrammatically, whilst a third table shows the ratios of the actual moments of inertia to those of corresponding homogeneous spheres.

DISCUSSION OF CENTRAL EUROPEAN LONGITUDES.—In a series of tables published in Nos. 3993-4 of the *Astronomische Nachrichten*, Prof. Th. Albrecht brings together, weighs and tabulates all the longitude results, affecting central European observatories, hitherto obtained. In the first table the longitude differences between 176 pairs of observing stations, as determined since 1863, are thus dealt with, whilst in the second the longitude differences between Greenwich transit circle and numerous other important circles or observatories are brought together. In the third table the corrections to be applied to the differences given in table i., as determined from the discussion of the whole set, are shown.